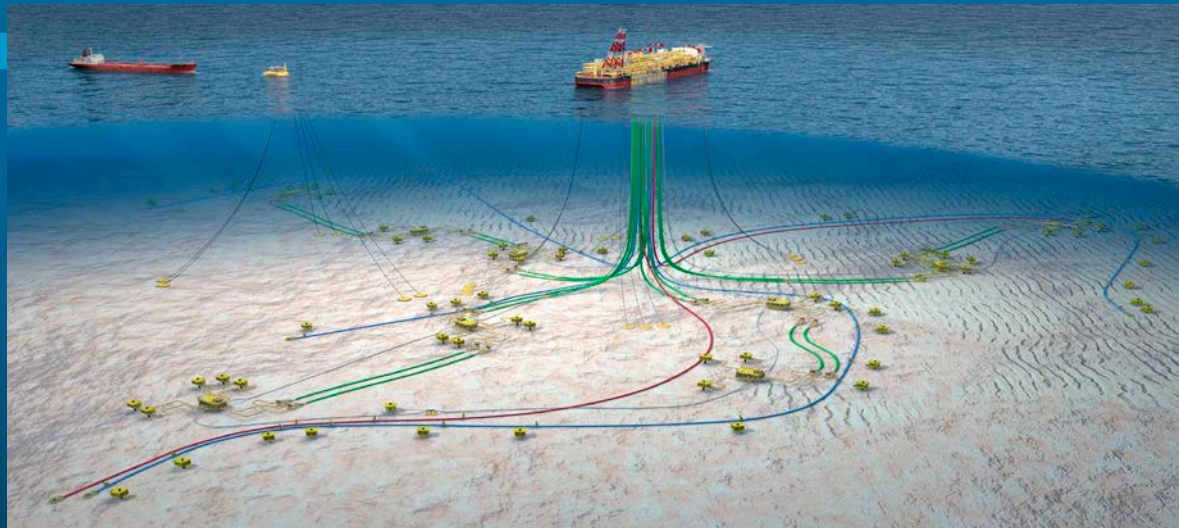




ADVANCED SUBSEA

DEEPWATER SUBSEA OPERATION SUPPORT



INNOVATIVE SURVEY SERVICES



ADVANCED SUBSEA

DEEPWATER SUBSEA OPERATION SUPPORT

ADVANCED SUBSEA sas

La Grande Arche - Paroi Nord - 92044 PARIS-LA-DEFENSE CEDEX

CXS – Centre for Experimentation – Sauzon

Rue Saint Nicolas 56360 Sauzon Belle Ile - France

ADVANCED SUBSEA DO BRASIL Ltda

Largo Sao Francisco de Paula 42/ sala 501, Centro - RIO de JANEIRO

ADVANCED SUBSEA Inc

2425 West Loop South, Ste 200 - HOUSTON - TX - 77027 –



DEEPWATER SUBSEA OPERATION SUPPORT



QHSE: CERTIFIED ISO 9001: 2008 (DNV)

- * FULL QUALITY SYSTEM IN USE, CERTIFIED NOV 2009 BY DNV – RE-ISSUED OCT 2012

QHSE: CERTIFIED ISO 14001:2004 & OHSAS 18001 (DNV)

- * FULL HSE SYSTEM IN USE, CERTIFIED JULY 2010 BY DNV - RE-ISSUED OCT 2012

SERVICES RANGE:

- * Positioning and Survey Construction Support for Offshore Field Development;
- * Mooring, Risers & Hull Inspection / UWILD;
- * Operational Oceanography



DEEPWATER SUBSEA OPERATION SUPPORT



ADVANCED SUBSEA operates on the IMR & Operation Support Market.
Its core business is:

- - Positioning Survey & ROV Construction Support
- - Rig Positioning & Drilling Support
- - Inspection, Maintenance & Repair (IMR, UWID)
- - Operational Oceanography: ocean modeling & Weather Forecast

DEEPWATER SUBSEA OPERATION SUPPORT



ADVANCED SUBSEA proposes cost effective solutions,

- - implementing state of the art or innovative methods,
- - deploying both innovative or proven tools ,
- - onboard standard Support Vessels or USV.

ADVANCED SUBSEA promotes Innovation in order to Save Time, Cut Costs or Solve new Problems

- ADVANCED SUBSEA key rules are:
 - Contracting main systems to Strategic Partners,
 - Developing local partnership with Specialised Companies
 - Securing support of Experts
 - Developing Knowhow and Technological Transfer
 - Implementing Innovation policy in partnership with Research Labs & Companies

DEEPWATER SUBSEA OPERATION SUPPORT PRE-ENGINEERING, PRE-LAY SURVEY



- DEEP WATER SURVEYS

Commercial in Confidence



● ULTRA-SHALLOW WATER SURVEYS

Surf zone & Shore Approach Pre-engineering Survey, Pipeline Inspection
Commercial in Confidence

DEEPWATER SUBSEA OPERATION SUPPORT



- DEEPWATER SURVEY CONSTRUCTION SUPPORT

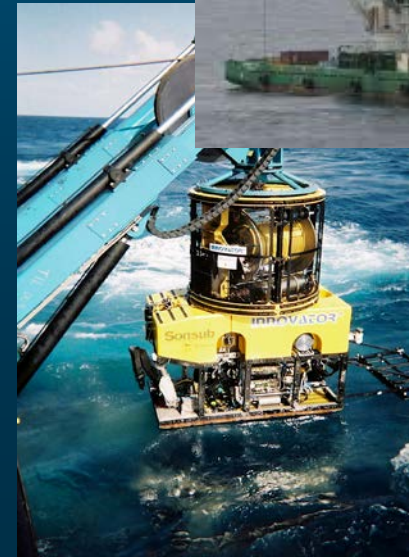
DEEPWATER SUBSEA OPERATION SUPPORT



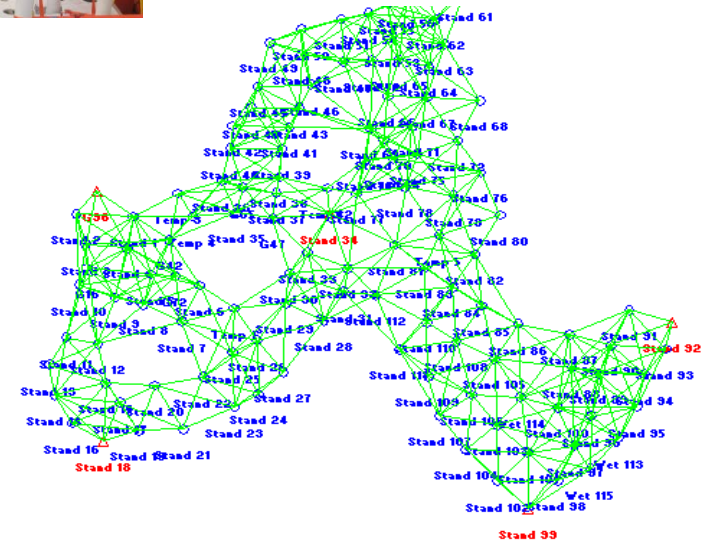
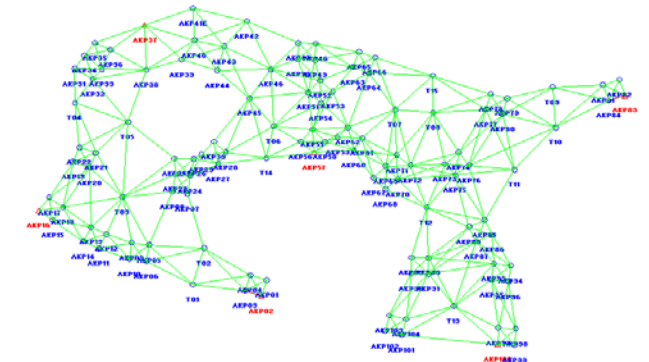
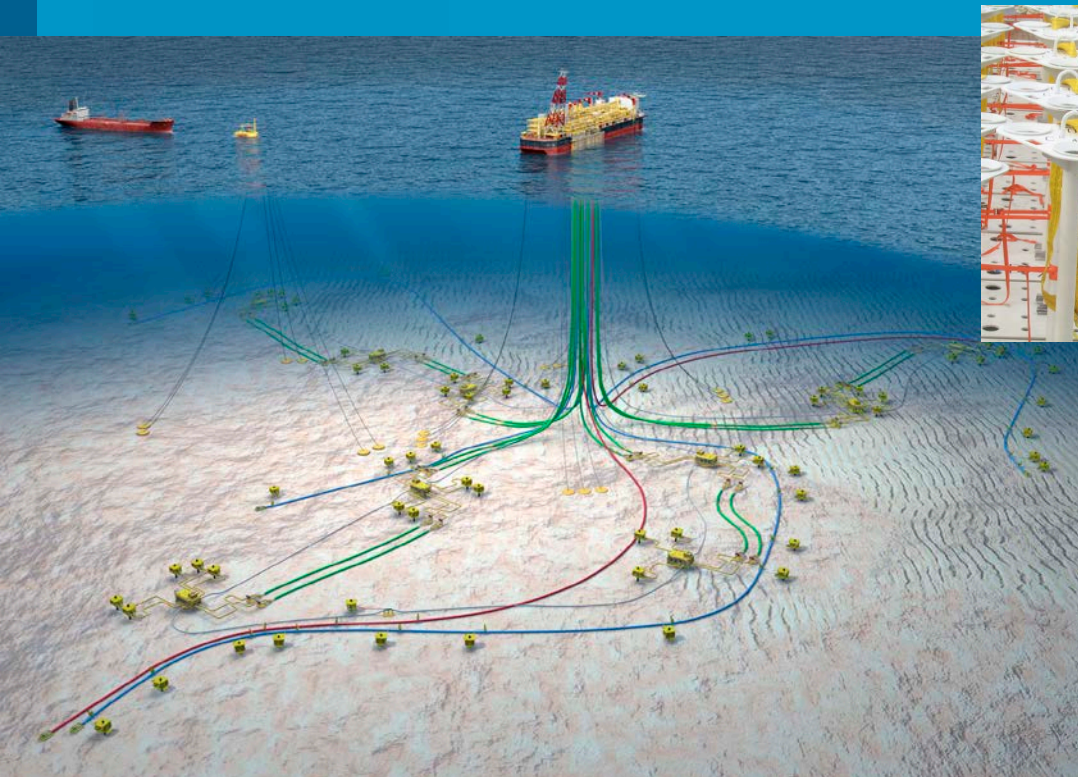
SCOPE OF SERVICES

SURVEY & ROV CONSTRUCTION SUPPORT SERVICES

- * SATELLITE & ACOUSTIC POSITIONING
- * PRE-LAY, AS-LAID, AS-BUILT SURVEY
- * TDP MONITORING
- * SUBSEA STRUCTURES POSITIONING & INSPECTION
- * LBL ACOUSTIC POSITIONING
- * TIE-IN METROLOGY : SPOOL PIECES, JUMPERS,



DEEPWATER SUBSEA OPERATION SUPPORT



- DESIGN OF ARRAYS & CALIBRATION METHODS
DALIA Field LBL Array (10km X 10km)

Commercial in Confidence

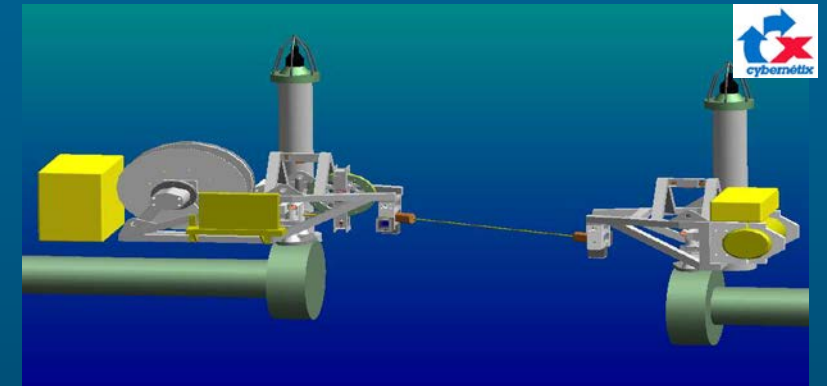
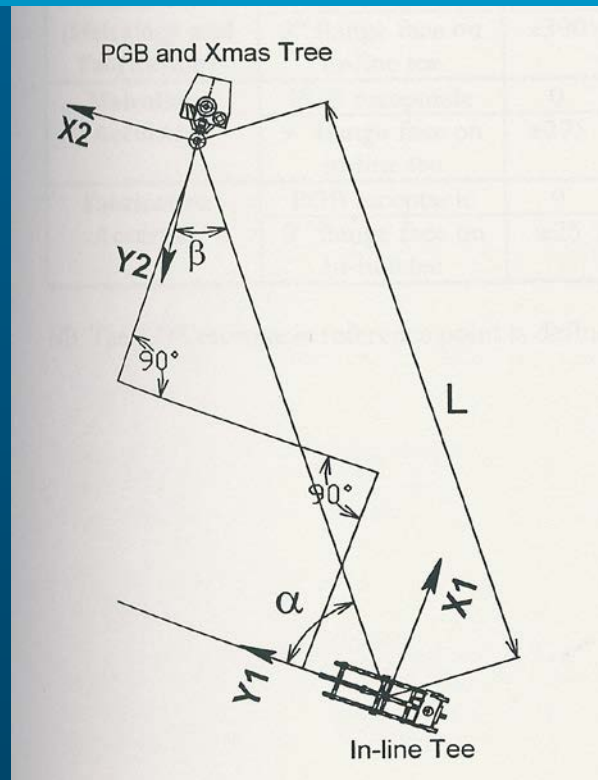
DEEPWATER SUBSEA OPERATION SUPPORT



- PIPELAYING - LBL POSITIONING SUPPORT

Commercial in Confidence

DEEPWATER SUBSEA OPERATION SUPPORT



3 METHODS IMPLEMENTED :

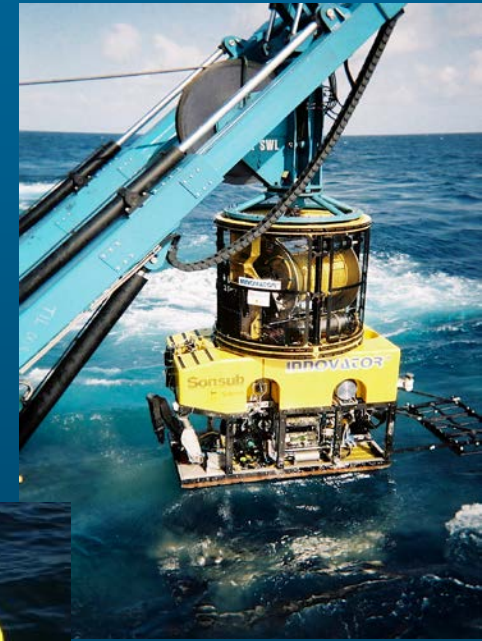
- TAUT-WIRE
- ACOUSTIC
- INERTIAL

INDEPENDENTLY OR HYBRIDIZED

● JUMPER/ SPOOL PIECE TIE-IN METROLOGY

Commercial in Confidence

DEEPWATER SUBSEA OPERATION SUPPORT



- INSPECTION, MAINTENANCE & REPAIR (IMR)

Mooring Systems, Risers, Structures, Pipeline Inspection

Commercial in Confidence

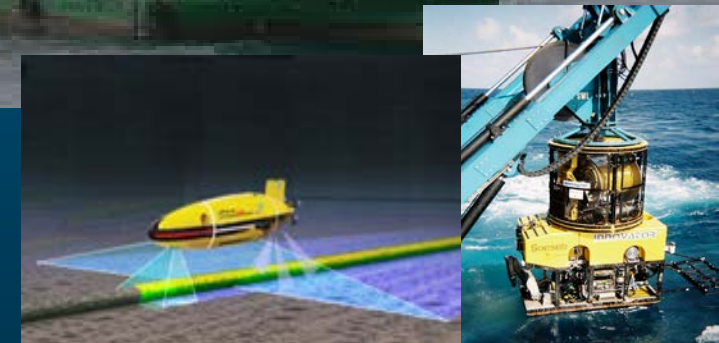
DEEPWATER SUBSEA OPERATION SUPPORT



SCOPE OF SERVICES

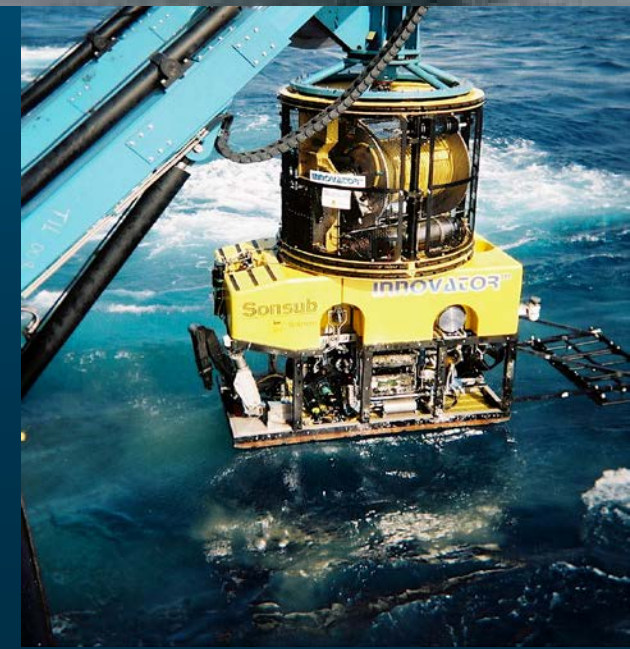
IMR SUPPORT SERVICES:

- * SEA-LINE/ RISERS INSPECTION
- * PIPE WALKING & LATERAL BUCKLING
- * CATHODIC PROTECTION SURVEY (CP)
- * MOORING SYSTEM INSPECTION
- * HULL INSPECTION - UWILD



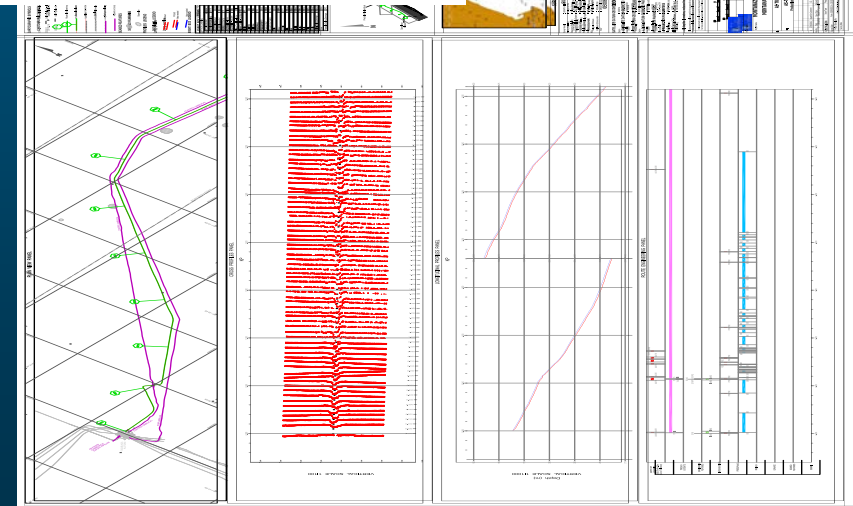
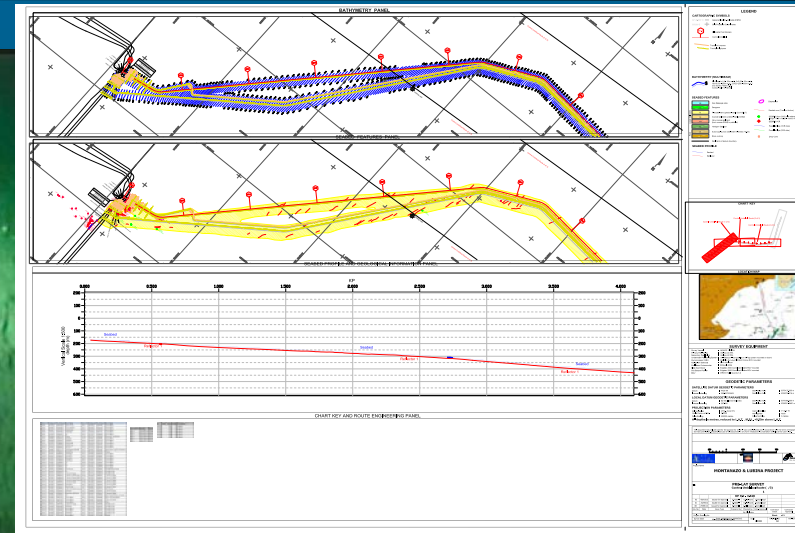
Commercial in Confidence

DEEPWATER SUBSEA OPERATION SUPPORT



- PIPE INSPECTION/ CP SURVEY

DEEPWATER SUBSEA OPERATION SUPPORT



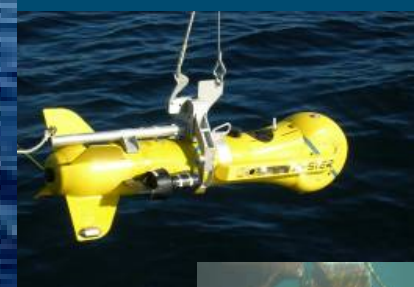
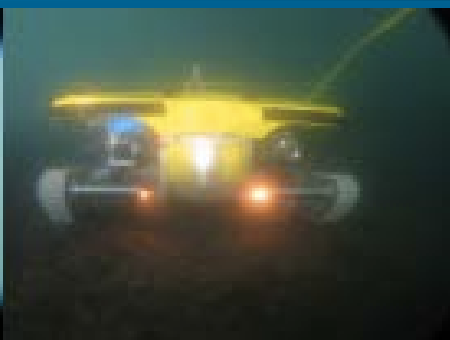
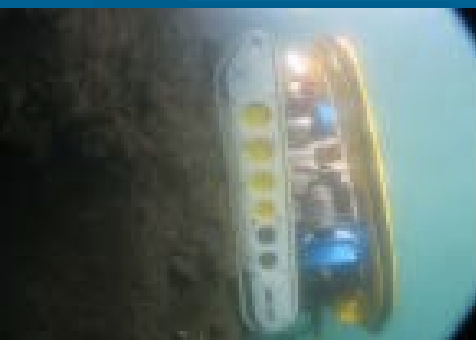
- SURVEY PROCESSING & REPORTING

DEEPWATER SUBSEA OPERATION SUPPORT



- MOORINGS, RISERS INSPECTION

INSPECTION-MAINTENANCE-REPAIR SUPPORT



- **HULL INSPECTION - UWILD (IMR)**

Close Visual Inspection, Wall thickness, Cathodic Protection, Cleaning

DEEPWATER SUBSEA OPERATION SUPPORT



- DEEPWATER ACOUSTIC RIG POSITIONING

Commercial in Confidence

DEEPWATER SUBSEA OPERATION SUPPORT



SCOPE OF SERVICES: RIG POSITIONING SERVICES

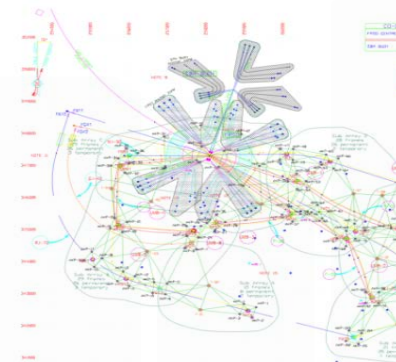
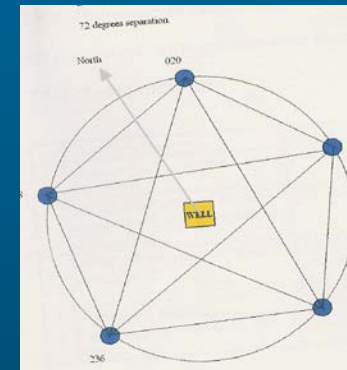
METHOD 1: SHALLOW WATER RIG POSITIONING METHOD

METHOD 2: USE DP ACOUSTIC SYSTEM FOR WELL SPUD-IN POSITIONING

METHOD 3: DEPLOYMENT & CALIBRATION OF DEDICATED LBL ARRAY

METHOD 4: DEPLOYMENT & CALIBRATION OF PERMANENT LBL ARRAY

METHOD 5: PRE-DEPLOYMENT & CALIBRATION OF RIG LBL ARRAY



Commercial in Confidence

WEATHER MONITORING AND FORECAST SERVICES

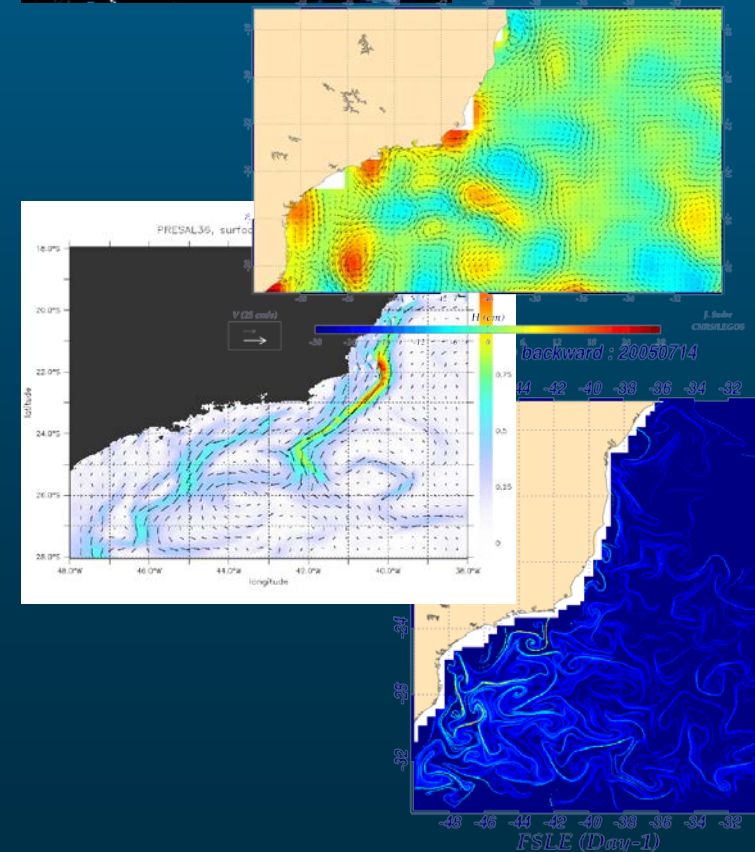


SCOPE OF SERVICES:

OPERATIONAL OCEANOGRAPHY

WEATHER FORECAST – METOCEAN STUDIES

- METOCEAN DATA ACQUISITION, PROCESSING
- ENGINEERING, SERVICING OF METOCEAN SYSTEMS
- METOCEAN DATA STATISTICAL ANALYSIS & REPORTING
- WEATHER FORECAST: METEO & OCEANOGRAPHY
- OIL SPILL, LARGE EDDIES STUDY

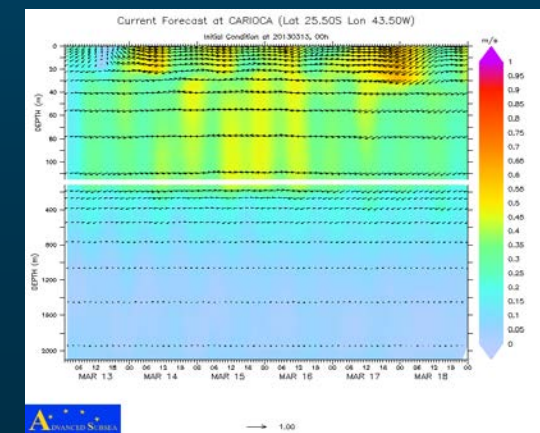
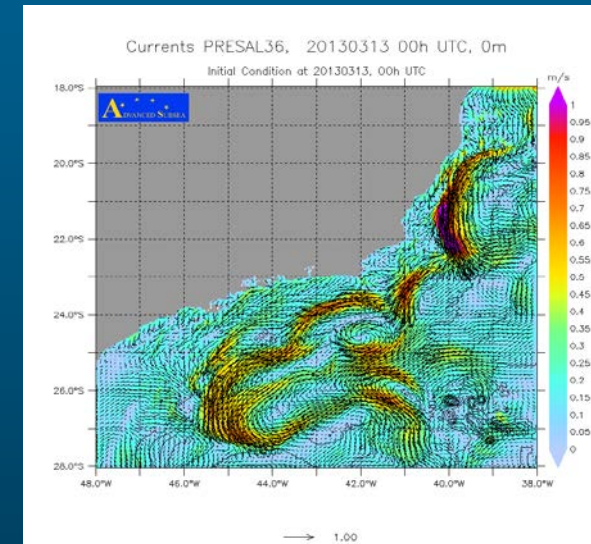
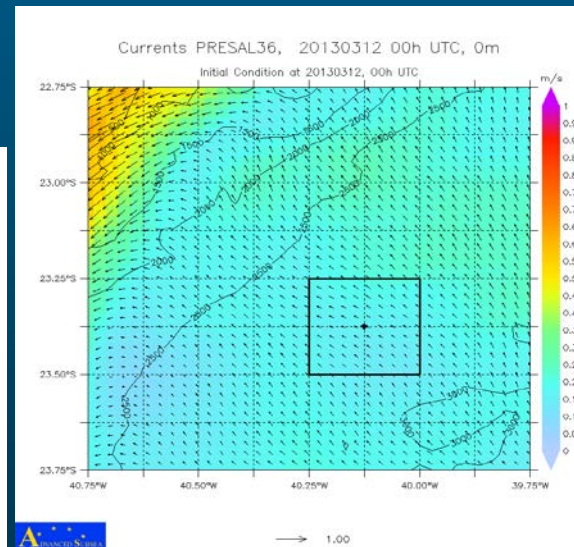
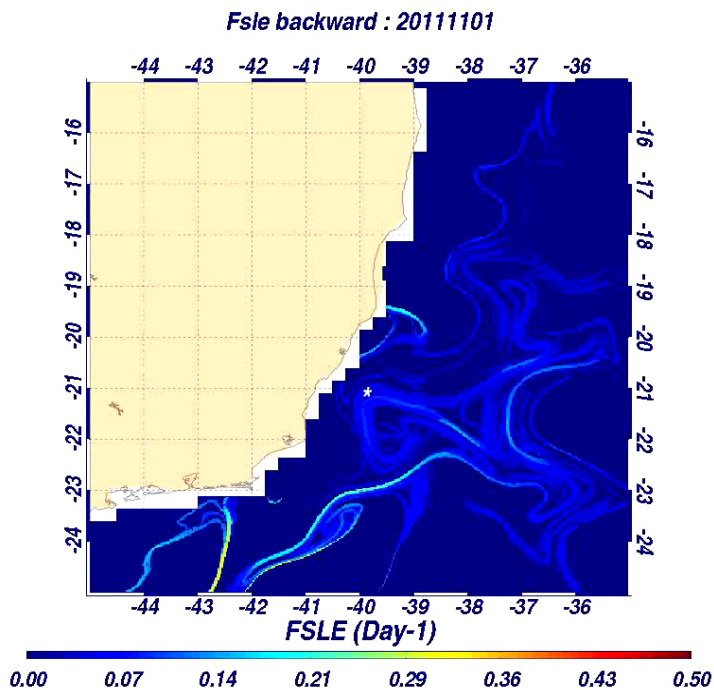


Commercial in Confidence

WEATHER MONITORING AND FORECAST SERVICES



SCOPE OF SERVICES: OPERATIONAL OCEANOGRAPHY WEATHER FORECAST – METOCEAN STUDIES



DEEPWATER SUBSEA OPERATION SUPPORT INNOVATION – RESEARCH & DEVELOPMENT



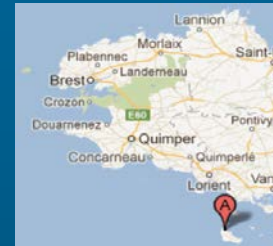
- R&D STRATEGY

DEEPWATER SUBSEA OPERATION SUPPORT INNOVATION – RESEARCH & DEVELOPMENT



SCOPE OF SERVICES:

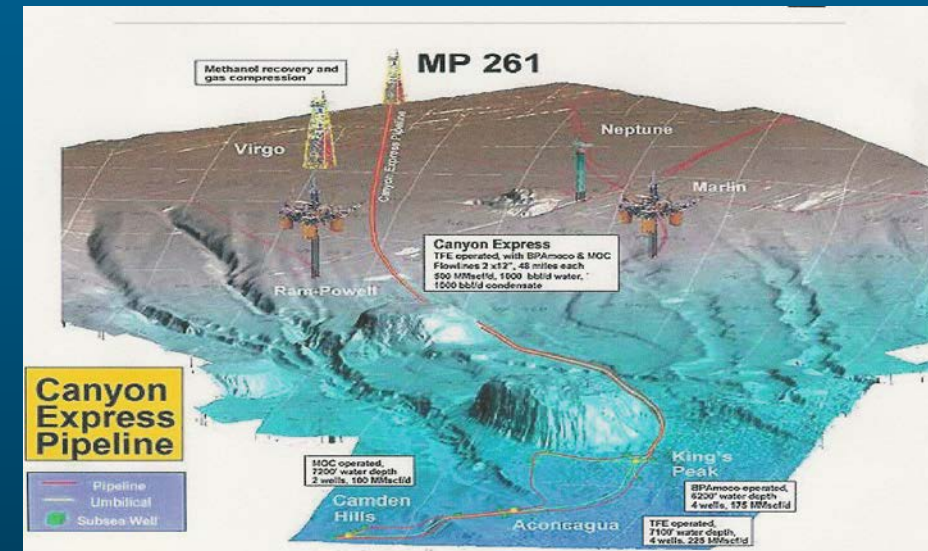
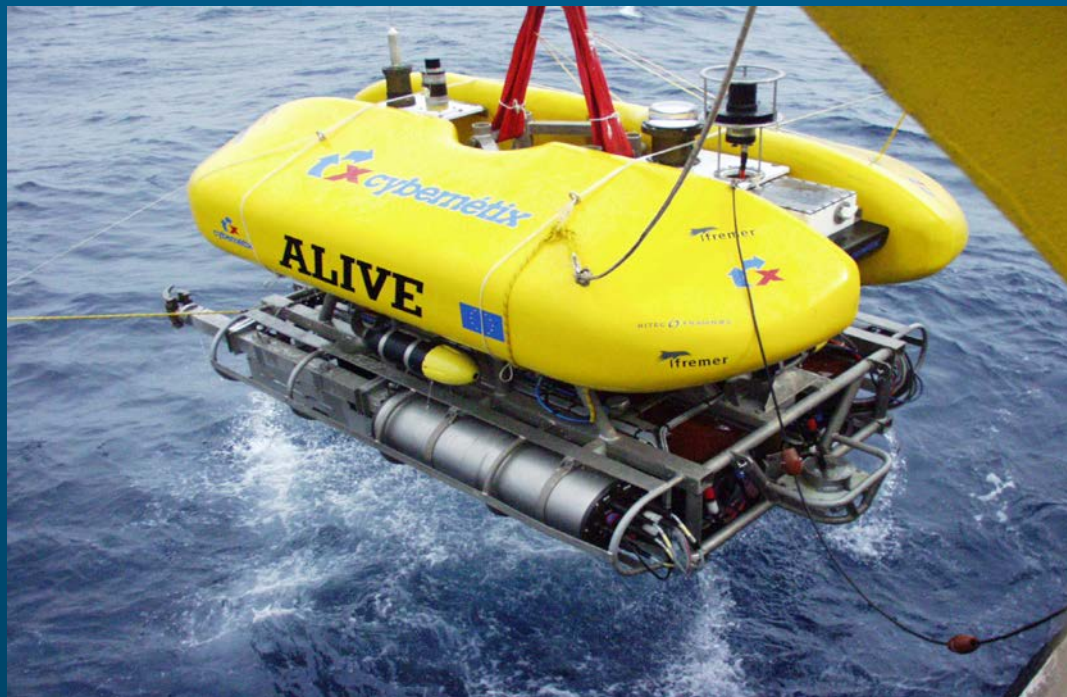
- Mobilisation & Seatrial Base for MRE survey services
 - Low cost Support vessels
 - High accuracy Surface positioning & Navigation
 - USBL/ LBL acoustic positioning
 - Data processing and Mapping
 - Survey data & Video management
 - Offices/ lodging/ Equipment storage capabilities
 - AS Experts Support for Procedures & Operations
 - Senior surveyors and Technician as required
-
- CXS - SAUZON EXPERIMENTAL CENTER



DEEPWATER SUBSEA OPERATION SUPPORT LIGHT INTERVENTION AUV - SUBSEA SUPPORT

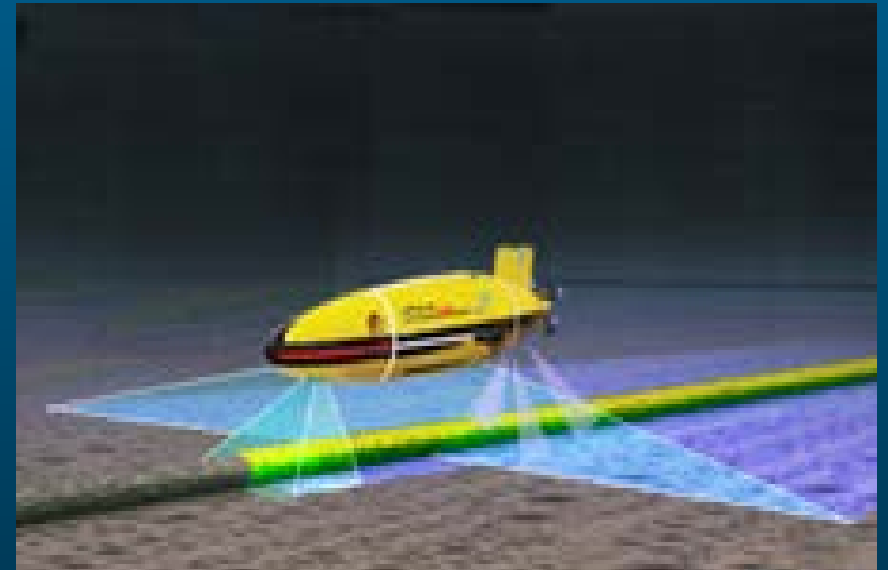


SUBSEA INTERVENTION AUV



- R&D PROGRAM
- DS-AUV: DRILLING SUPPORT & INTERVENTION

DEEPWATER SUBSEA OPERATION SUPPORT NEW CONCEPTS IN “A.U.V.” DEVELOPMENT



- R&D PROGRAM
- CS-AUV: SURVEY CONSTRUCTION SUPPORT

DEEPWATER SUBSEA OPERATION SUPPORT



AUV SURVEY CONSTRUCTION SUPPORT SERVICES:

- * PRE-LAY, AS-LAID, AS-BUILT & SURVEY
- * TDP MONITORING
- * SUBSEA STRUCTURES POSITIONING & INSPECTION
- * PIPE WALKING & LATERAL BUCKLING

,



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NEW MOORING & RISER INSPECTION SPREAD: DEEP WATER



ALISTAR 3000 INSPECTION AUV

Embarked batteries,

Supervised automatic inspection,

Optional Fiber Optical Tether

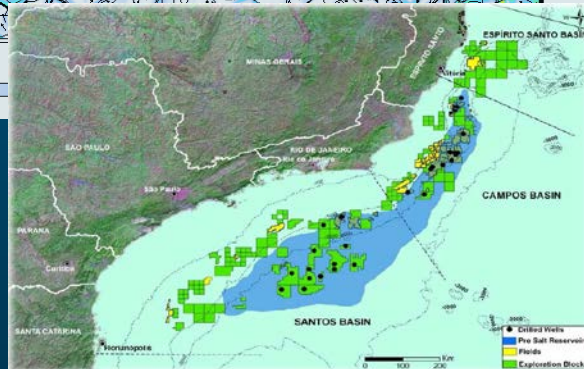
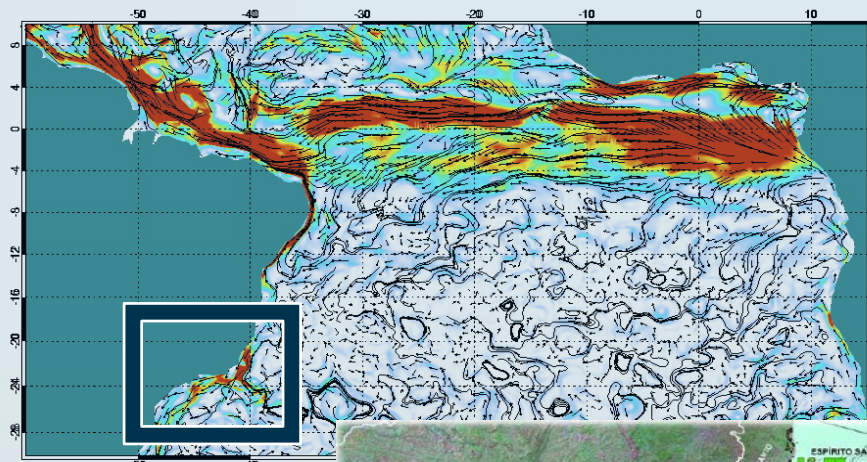
Deployed from a Supply Vessel or from the FPSO

- R&D PROGRAM
AUV MOORING & RISERS INSPECTION

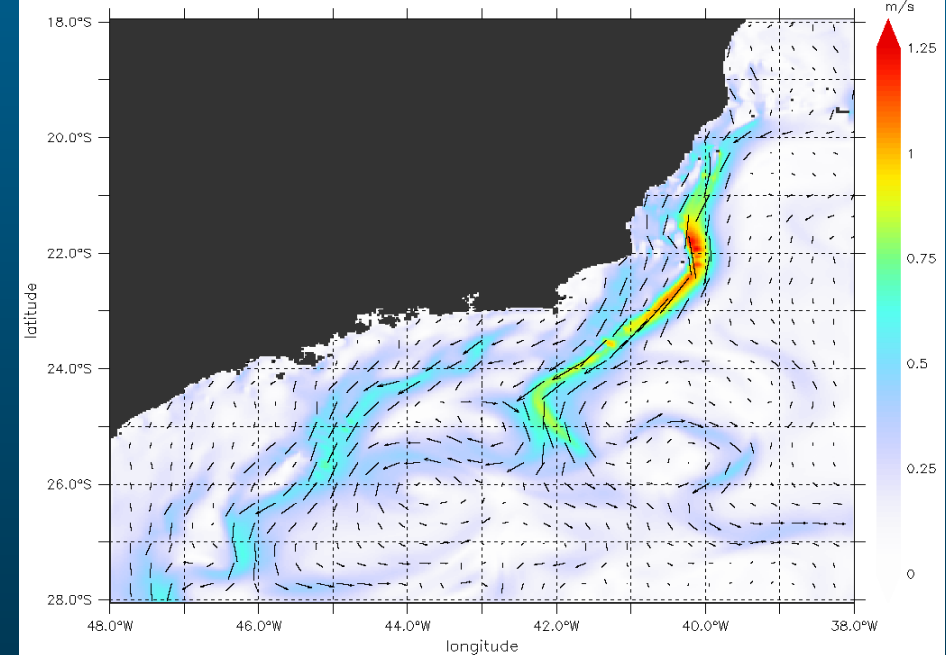
DEEPWATER SUBSEA OPERATION SUPPORT WEATHER FORECAST & OPERATION SUPPORT



PSY4 Currents 20100616 Tropical Atlantic



PRESAL36, surface current 25/12/2010



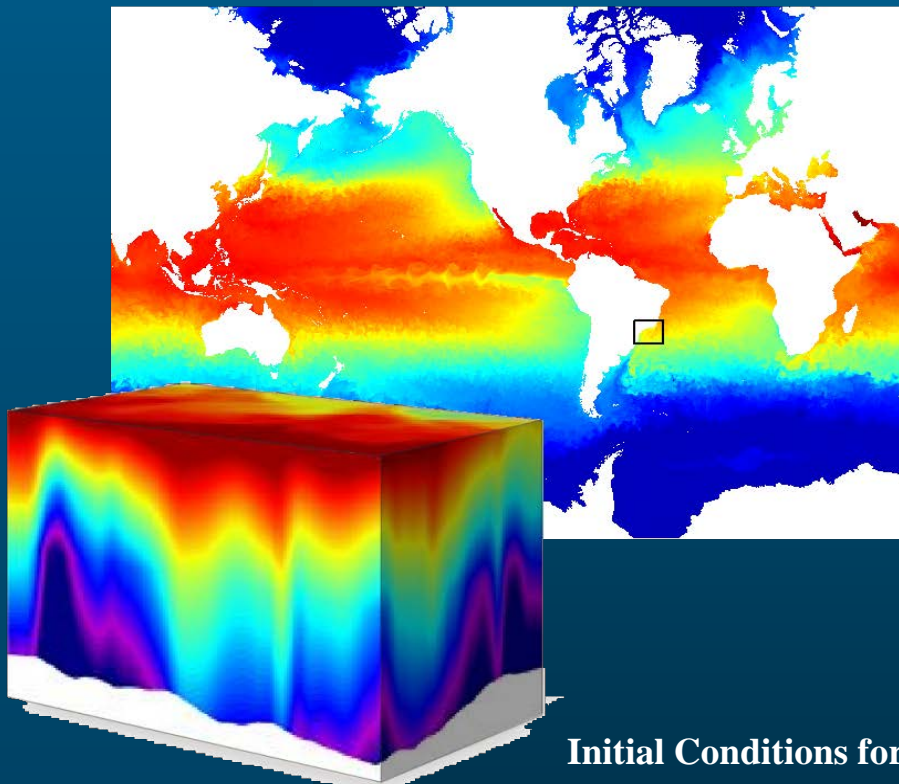
● R&D PROGRAM

JIP 1&2 PRESAL36: An High Resolution Ocean Current Model

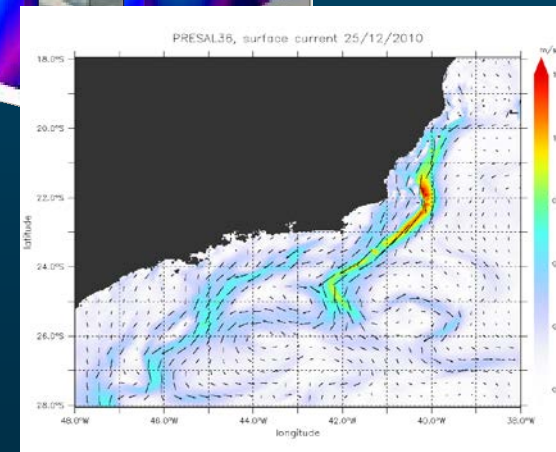
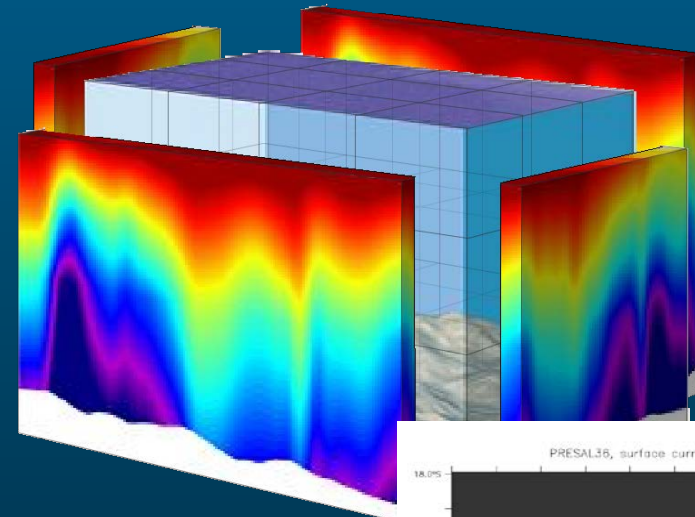
DEEPWATER SUBSEA OPERATION SUPPORT SUBSEA ENGINEERING & OPERATION SUPPORT



Open Boundary Conditions for PreSal36



Initial Conditions for PreSal36



PSY4 + Tide + Gina Bathy + 3 hours Forcing → Presal36

MAIN REFERENCES



STUDIES

- * Use of AUV for Construction Support, IRM tasks and Light Subsea Intervention (2005-2016)
- * Method for Calibration of Large Deepwater LBL arrays
- * Cost Saving Procedures for Deepwater Acoustic Rig Positioning
- * Improvement of Tie-In Metrology Tools and Procedures (Multi and Hybrid Metrology)

SERVICES, QC MANAGEMENT & SUPERVISION

- * MONTANAZO & LUBINA - Deep Water Survey Construction Support (REPSOL)
- * BLOCK 31- Drilling Program Acoustic Rig Positioning (BP ANGOLA)
- * BONGKOT- Overall Survey QC Management for Platform Installation (PTTEP)
- * AKPO/ USAN- Drilling Program Acoustic Rig Positioning (TEPNL)
- * AKPO - Overall Survey QC Management for Field Development Operations (TUPNI)
- * DALIA - Overall Survey QC Management for Field Development Operations (TEPA)
- * MOHO-BILONDO - Overall Survey QC Management for Field Development Operations (TEPC)
- * DALIA/ ROSA/ AKPO - LBL Array Installation & Calibration (TOTAL)
- * BESPS PSM - Docking/ Fixing Pile Installation/ As-built Metrology (AGIP/ BCD)
- * MATTERHORN TLP Piles Installation Support (TOTAL Inc)
- * CANYON EXPRESS Survey Construction Support Management (SAIBOS FDS)

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MAIN REFERENCES



DEEPWATER METHOD DEVELOPMENT

- * AKPO DEEPWATER DISCOVERY Acoustic Rig Positioning Procedure (TOTAL NIGERIA)
- * ROSA SAIPEM 10 000 Acoustic Rig Positioning Procedure (TOTAL ANGOLA)
- * MOHO LEIV EIRIKSSON Acoustic Rig Positioning Procedure (TOTAL CONGO)
- * MOHO STENA-T Acoustic Rig Positioning Procedure (TOTAL CONGO)

- * MOHO-BILONDO - LBL Array Design & Calibration Method (TOTAL)
- * AKPO - LBL Array Design & Calibration Method (TOTAL)
- * ROSA - LBL Array Design & Calibration Method (TOTAL)
- * DALIA - LBL Array Design & Calibration Method (TOTAL)
- * MATTERHORN TLP: Pile Metrology method (TOTAL)

- * CANYON EXPRESS Project - 2350 m - LBL Acoustic Positioning Method Statement
- * SAIBOS FDS J-LAY DP Vessel: Survey Construction Support Method Statement
- * GIRASSOL Project - 1450 m - Positioning, Survey & DP Interfacing Specification

QUESTIONS...



DEEP WATER "DALI" FISH
2200 msw
(observed during Canyon Express pre-survey)

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